EFFECTIVENESS OF OPEN SUCTION VS CLOSED SUCTION METHOD ON CARDIO RESPIRATORY PARAMETERS AMONG PATIENTS WITH MECHANICAL VENTILATORS, IN SELECTED HOSPITAL, CHENNAI.

DISSERTATION SUBMITTED TO

THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY

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IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Tracheal suctioning is an essential component of airway management for patients requiring mechanical ventilation and it is one of the most common invasive procedures performed in any critical care unit today. The primary goals of the suctioning procedure are secretion removal in order to maintain airway patency, decrease airway resistance, achieve optimal oxygenation. Complications of tracheal suctioning include respiratory and cardiac arrest, hemodynamic instability, hypoxia, increased intracranial pressure, bronchospasm, hemorrhage, and tracheal damage.

Tracheal secretions in mechanically ventilated patients are removed using a catheter via the endotracheal tube. The suction catheter can be introduced by disconnecting the patient from the ventilator (open suction system) or by introducing the catheter into the ventilatory circuit (closed suction system). -

The research approach used in this study was quantitative approach. The research design is non randomized clinical trial, time series study. The study was conducted in Malar Hospital, Chennai. Objective of the study was to assess the effectiveness of open suction Vs closed on cardio respiratory parameters among patients with mechanical ventilators. A total of 40 patients with mechanical ventilator who full fill the inclusive criteria were selected using purposive sampling technique, cardiac monitor was used to assess the cardio respiratory parameters, suctioning procedure done daily.

The data analysis was done by using descriptive and inferential statistics. The study finding revealed that in cardiac parameter under open there is significant changes in open suction method in heart rate, MAP and respiration, SPO2 and ‘t’ value is 10.32 and P= 0.001 null hypothesis was rejected. In closed

suction there is no significant changes in heart rate, MAP, oxygen saturation and respiration rate and ‘t’ value is 4.67 and P= 1.0. Null hypothesis was accepted.

The nurse play a vital role in assessing the cardiac monitor while doing suctioning to prevent cardio respiratory complications.

CHAPTER – I

INTRODUCTION

Cardiac respiratory system functions as a vital zone in human body. Cardiac respiratory system always goes hand to hand as one system which cannot function as an individual organ. Both are interrelated with each other to maintain normal living of the human. Cardio respiratory disease is the most common cause for hospitalization and secondary common cause of death in adult less than 85years of age. Common cardio respiratory problem is CAD (coronary artery disease), hypertension, atherosclerosis, COPD (Chronic Obstructive Pulmonary Disease), respiratory acidosis and ARDS (Acute Respiratory Distress Syndrome).

Endotracheal suctioning (ES) is an essential and frequently performed procedure for patients requiring mechanical ventilation (MV).The majority of patients admitted to Intensive Care Units (ICU's) require an artificial airway and mechanical ventilation (MV). Reasons for this can be trauma, acute respiratory failure or the need for airway protection and/or because of low consciousness. Endo tracheal suctioning commonly performed by the ICU nurses.

In Endotracheal suctioning, secretions are cleared from the tracheo-bronchial tree in order to guarantee optimal oxygenation and to prevent accumulation of secretions, tube occlusion, increased work of breathing, prevent atelectasis and pulmonary infections. Although necessary, the procedure is invasive, uncomfortable and potentially hazardous. The recommended suctioning methods, the closed suction technique and open suction technique are used in hospital settings.

Endo tracheal open suction System is performed with a single-use open suction system (OSS), which necessitated disconnection of the patient from the

ventilator and introducing a single-use of suction catheter into the patient's endotracheal tube. Closed suction allows partial ventilation and oxygenation during suction. Many patients need special care, including endo-tracheal intubation and ventilators support. Vigorous airway manipulation leads to mucosal stimulation and production of mucus, which pave way for frequent suctioning . Complication accompany during suctioning are dyspnea, tachycardia, bradycardia, tachypnea severe hypoxia etc..,. Significant amount of complication can be controlled by closed tracheal system. This type of airway leads to mucosal stimulation and production of mucus. Suctioning is accomplished with complications such as severe hypoxia and significant cardiovascular disorders.

Although endotracheal suctioning is a routine nursing intervention, this procedure can lead to an increase in intracranial pressure (ICP). This study was planned to determine the appropriate suctioning technique (open system suctioning [OS] and closed system suctioning [CS]) to minimize the variability of ICP and cerebral perfusion pressure (CPP) in neurologically impaired patients. A crossover, single-blind clinical trial study was conducted on 32 neurosurgical patients who underwent ICP monitoring, intra-arterial blood pressure monitoring, and endotracheal intubation in the intensive care unit. According to the need for suctioning, each patient in the experimental and control groups underwent suctioning with both closed and open systems. Recordings were made on ICP, mean arterial blood pressure, CPP, heart rate (HR), and arterial blood gases during suctioning. The result revealed that there was no significantly increased ICP, mean arterial blood pressure, CPP, and HR. ICP was found to be significantly higher in Open Suction compared with Closed Suction. **Prasana (2010)**

BACK GROUND OF THE STUDY

Out Of 6,469,674 hospitalizations in the six states, 180,326 (2.8%) received invasive mechanical ventilation. There was a wide age distribution with 52.2% of patients <65 yrs of age. A total of 44.6% had at least one major co-morbid condition. The most common co-morbidities were diabetes type II (13.2%) and pulmonary disease (13.2%). In hospital mortality was 34.5%, and only 30.8% of patients were discharged home from the hospital. Projecting to national estimates, there were 790,257 hospitalizations involving mechanical ventilation in 2005, representing 2.7 episodes of mechanical ventilation per 1000 population. Estimated national costs were $27 billion representing 12% of all hospital costs. Incidence, mortality, and cumulative population costs rose significantly with age.

Mechanical ventilation is often a life-saving intervention, but carries many potential complications including pneumothorax, airway injury, alveolar damage, and ventilator-associated pneumonia. Other complications include diaphragm atrophy, decreased cardiac output, and oxygen toxicity. One of the primary complications that presents in patients who are mechanically ventilated is acute lung injury (ALI)/acute respiratory distress syndrome (ARDS).ALI/ARDS are recognized as significant contributors to patient morbidity and mortality.

Mechanical ventilation is indicated when the patient's spontaneous ventilation is inadequate to maintain life. It is also indicated as prophylaxis for imminent collapse of other physiologic functions, or ineffective gas exchange in the lungs. Because mechanical ventilation only serves to provide assistance for breathing and does not cure a disease, the patient's underlying condition should be correctable and should resolve over time. In addition, other factors must be taken into consideration because mechanical ventilation has its own setbacks.

The endotracheal suctioning technique is classically performed by means of the open tracheal suction , which involves disconnecting the patient from the

ventilator and introducing a single use suction catheter in to the endotracheal tube. During the late 1980's the closed endotracheal suction system was introduced as safest suctioning method on mechanical ventilator**. (Carlon1987)**.

The advantages of closed suction compared to open suction are improved oxygenation and decrease hypoxia and loss of lung volume. Some studies reported that the incidence of colonization increased when a Closed Tracheal Suction System was used but noted that Ventilated Associated Pnemonia incidence was similar whether suctioning was done with OTSS or CTSS **(Deepa 1990, Johnson, 1994).**

The use of a CTSS (closed tracheal suction system) reduced VAP (ventilated associated pneumonia) incidence without demonstrating any adverse effect **(Combes2000).** Closed suction systems (CSS) are increasingly replacing open suction systems (OSS) to perform endotracheal toileting in mechanically ventilated intensive care unit patients. Yet effectiveness regarding patient safety and costs of these systems has not been carefully analyzed**. (Sherly 2004).**

NEED FOR THE STUDY

Endotracheal suctioning, is one of the most common invasive procedures carried out in an intensive care unit (ICU), this is used to enhance the clearance of respiratory tract secretions, improve oxygenation and prevent atelectasis. As an essential part of care for intubated patients, its major goal is to ensure adequate ventilation, oxygenation and airway patency. Endotracheal suction involves patient preparation, suctioning and follow-up care as part of the procedure **(McKelvie 1998, Wood 1998).**

Major hazards and complications of endotracheal suctioning include hypoxaemia, tissue hypoxia, significant changes in heart rate or blood pressure, presence of cardiac dysrhythmias and cardiac or respiratory arrest. Additional complications include tissue trauma to the tracheal or bronchial mucosa, broncho-

constriction or bronchospasm, infection, pulmonary bleeding, elevated intracranial pressure and interruption of MV **(Grap 1996; Maggiore 2002; Naigow 1977)**

Many patients need special care, when the patient is admitted with mechanical ventilation in ICU. This type of airway leads to mucosal stimulation and production of mucus. Suctioning is accomplished with complications such as severe hypoxia and significant cardiovascular disorders. Selecting the least dangerous way of endotracheal tube suction can reduce severe complications.

This study compared the effect of two open and closed methods of suction on the pattern of heart rate and arterial blood oxygen saturation. Closed suction systems (CSS) are increasingly replacing open suction systems (OSS) to perform. Endotracheal suctioning in mechanically ventilated intensive care patients. Fifteen trials were identified Randomised controlled trials comparing CSS and OSS in adult intensive care patients were retrieved. Conclusions could be drawn with respect to arterial oxygen saturation (five studies, 109 patients), arterial oxygen tension (two studies, 19 patients), and secretion removal (two studies, 37 patients). Compared with OSS, endotracheal suctioning with CSS significantly reduced changes in heart rate (four studies, 85 patients; weighted mean difference, –6.33; 95% confidence interval, –10.80 to–1.87) and changes in mean arterial pressure (three studies, 59 patients; standardised mean difference, –0.43; 95% confidence interval, –0.87 to 0.00) .Based on the results of this meta-analysis, there is no evidence to prefer CSS more than OSS.

Investigator had worked in the intensive care unit during clinical posting and observed many changes in cardio respiratory parameter during suctioning and scare no researcher on this topic made the investigator to develop interest on this topic.

STATEMEMT OF PROBLEM

A comparative study to assess the effectiveness of Open suction Vs Closed suction method on Cardio Respiratory parameters among patients with mechanical ventilators, in selected hospital ,Chennai.

OBJECTIVES

Objectives of the study includes:

1. To assess the effectiveness of open suction Vs cardio respiratory parameters .among patients with mechanical ventilators.
2. To assess the effectiveness of closed suction Vs the cardio respiratory parameters .among patients with mechanical ventilators.
3. To compare the open suction and closed suction method with cardio respiratory parameters among patients with mechanical ventilator.
4. To associate the selected demographic variables with cardio respiratory parameters among patients with mechanical ventilators.

OPERATONAL DEFINITION

Effectiveness:

Effectiveness refers to comparing open and closed suction method with or with out minimal changes in cardiac respiratory parameters.

Open Suction:

Open suction refers to disconnecting the patient from the ventilator and introducing a single-use sterile suction catheter into the tracheal tube and suctioning is done for five times a day every 2 hourly.

Closed Suction:

Closed suction refers to without disconnecting the patient from ventilator and suctioning is done for five times a day every 2 hourly.

Cardio respiratory parameter variations:

Cardio respiratory parameter refers to it include Heart rate and MAP, SpO2, Respiration rate.

NULL HYPOTHESES

NH_1: There is no significant difference between open and closed suction methods on cardio respiratory parameters among patients with mechanical ventilators.

NH_2: There is no significant association between the selected demographic variables with effectiveness of open suction versus closed suction method on cardio respiratory parameters among patients with mechanical ventilators.

DELIMITATION

The Study was delimited to the period of four week of date collection

CONCEPTUAL FRAMEWORK

A concept is an idea, and conceptual frame work is a group of concepts or ideas that are related to each other but the relationship is not explicit. Conceptual frame work deals with abstractions that are assembled by virtue of their relevance to a common theme. **(Polit and Hungler, 1989).**

This study was based on General System Theory by Ludwig Von Bertanlaffy's in 1962. This theory helped to provide a common framework that created shared and common language that scientists from different disciplines can use to communicate their findings. Simply put, system theory is used to understand how things around us work.

General system theory looks at the world as a system composed of smaller subsystems. System as a representation of life phenomena are used by humanity

in everyday life to describe the functioning of these phenomena. It is useful for the break down the whole process into separate task to assure goal realization.

System is a collection of independent but interrelated elements or components organized in a meaningful way to accomplish an overall goal.
This model consists of three phases,

- Input
- Throughput
- Output

Input:

Inputs include raw material, energy and resources processed to produce the outputs of the organization. Though the process of selecting the system regulates the types and the amount of input received, some types of inputs are used immediately in their original state.

In this study, input refers to the demographic data of patient with mechanical ventilator. The investigator also monitor the cardio respiratory parameter before and during suctioning among patient with mechanical ventilators in selected hospital Chennai.

Throughput:

Throughput is the processes used by the system to convert raw materials or energy (input) from the environment into products or services that are usable by either the system itself or the environment.

In this study, it refers to perform open and closed suction method and to assess cardio respiratory parameter among patient with mechanical ventilator.

Output:

After processing the input, the systems return the output to the environment in an altered state affecting the environment. Output is the product or service which results from the system's throughput or processing of technical, social, financial and human input.

In this study, the output refers to the assessment of monitoring the cardio respiratory parameter by cardiac monitoring on during suction.

Feedback:

Feedback is information about some aspect of data or energy processing that can be used to evaluate and monitor the system and to guide it to more effective performance. It refers to the environmental response of the system. Feedback may be positive, negative or neutral.

In this study, refers to there is a significant different in open suction method and closed suction method during suction heart rate, oxygen saturation, and MAP. There is no significant different in respiration rate.

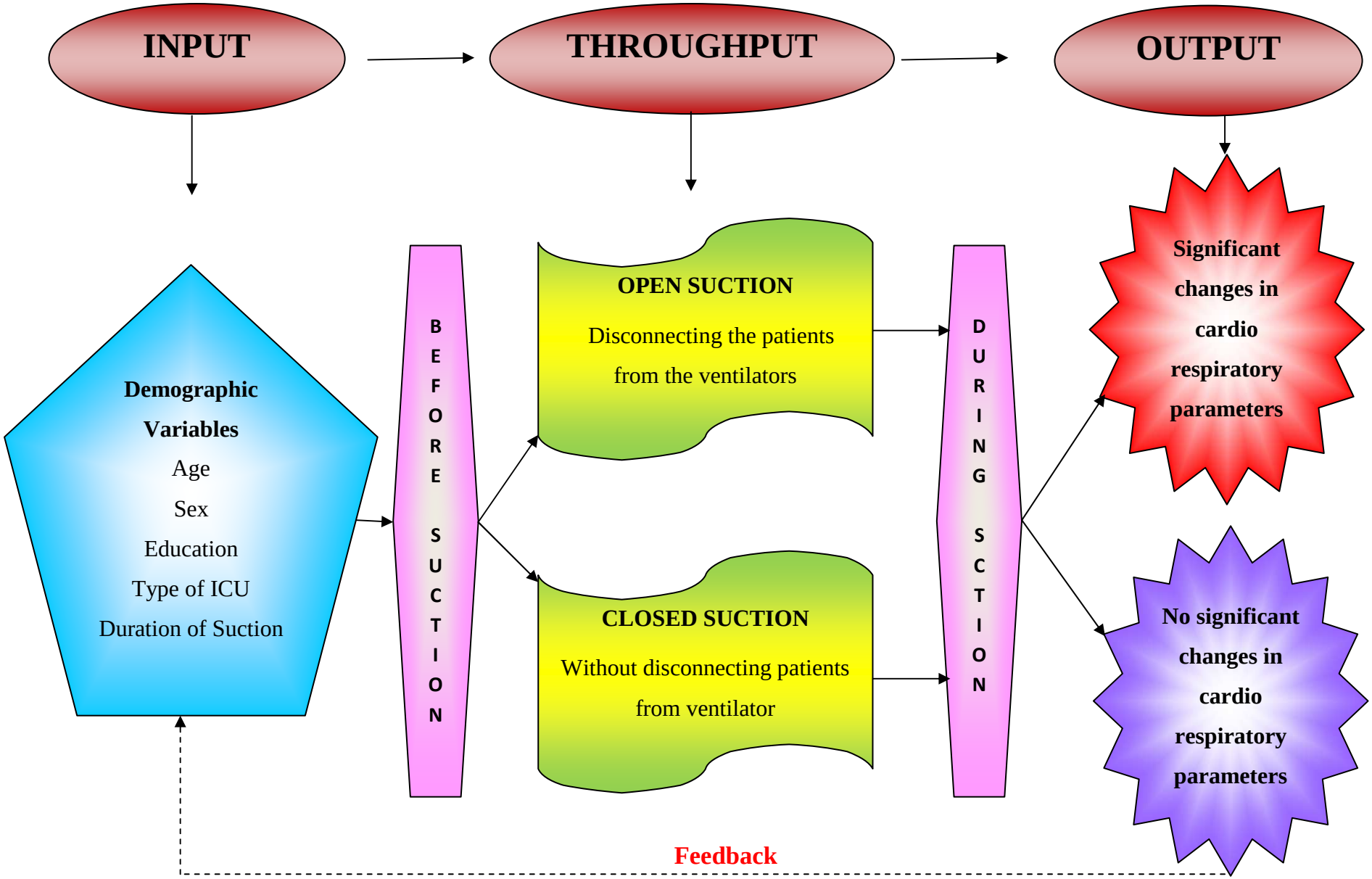


Figure 1: Modified General System Theory by Ludwig Von Bertanlaffy's (1962)

CHAPTER – II

REVIEW OF LITERATURE

A literature review is defined as a summary of research on a topic of interest, often prepared to put a research problem in to context **(Polit and Beck, 2008)**.

This chapter presents a review of selected literature that relevant to the study. Review of literature is important step in the development of the research project and in broadening, understanding and developing an insight into the problem area.

The researcher has organized the related under the following heading after receiving various published articles, textbook, report and medline search.

SECTION A: Literature relate to incidence and prevalence of cardiac and respiratory disease

SECTION B: Literature related knowledge and practice of open and closed suction among registered nurses.

REVIEWS RELATED TO INCIDENCE AND PREVALENCE OF SELECTED RESPIRATORY DISEASES

AV Huovinen. E, et.al, (2004), conducted a study to examine the prevalence of asthma and hay fever and the incidence and temporal relationships of asthma, Hey fever and chronic bronchitis among adult twins during a 15-year period. Prospective cohort study design was used for this study. A population of 11540 adult men and women age group between 18-45yrs. Age standardized prevalence and cumulative incidence among individuals were calculated for asthma, hey fever, chronic bronchitis. Results showed prevalence of asthma increased from 1975(2%-men,2.2%-women) to1990 (2.9%-men, 3.1%-women).

Jaime Correla de, Maria Espirito (1999), conducted a study on hypertension in an urban population in Portugal. A prevalence of hypertension an observational study was conducted on 1999. A random sample of 590 patients, stratified by age and gender was obtained from data bases of registered patients. Data was collected using questionnaire based on cardiac symptoms. Results showed that the mean age for patients with hypertension was 45yrs. Hypertension was diagnosed in 59 persons giving prevalence of 10.24%. There was no statistically significant difference in the prevalence of hypertension by gender.

Vohlonen I, Tupi K et.al (2001), conducted a study on prevalence and incidence of chronic bronchitis and farmer's lung with respect to the geographical location by cross sectional survey of 12,056 farmers. The incidence of chronic bronchitis 2,687 new cases annually per 100,000. Chronic bronchitis is more common among farmers in livestock production than among those in grain production.

Manning. P, Good man.E, et.al, (2002), conducted a study to examine the prevalence of bronchitis in teen age who actively or passively smoke cigarettes by cross sectional survey. Questionnaire survey of smoking habits in secondary school children aged 13-14 yrs. 3066 subject completed a questionnaire survey on smoking habits and symptoms of cough. They found that 20.7% teen are active smoker (male-17.6%, female-23.3%) and 46.3% of non smoking subject exposed to smoking in the home. The results showed that increased bronchitis symptoms occur in teenager exposed to active or passive smoking.

Jan Brozek, Ellen McDonald, et al., (2007) conducted a study on pneumonia observational incidence and treatment. A multi disciplinary process improvement study by prospective cohort study, sample consists of all consecutive patients with pneumonia treated in ICU during 3 month period. Data were collected on incidence of pneumonia, diagnostic investigation, antibiotic prescribed. Results showed on 194 admission, 73 patients treated for pneumonia

(47-community acquired, 12-hospital acquired, ventilator associated pneumonia). On conclusion most cases were community acquired and most common organism was gram positive staphylococcus.

Rantala.A, et. Al., (2011), conducted a study on respiratory infections proceeds adult onset asthma using descriptive approach. 521 asthmatic patients were selected by using randomized clinical trials. Information on respiratory infections was collected by a self administered questionnaire. Result showed that recently experienced respiratory infections are a strong determinants for adult onset asthma.

LITERATURE RELATED KNOWLEDGE AND PRACTICE OF OPEN AND CLOSED SUCTION AMONG REGISTERED NURSES

Gorbenko PP, Adamova IV, (2007) This quasi-experimental study was a randomized, controlled, single-blinded comparison of two research-based teaching programmes, with 20 intensive care nurses, using non-participant observation and a self-report questionnaire. Initial baseline data revealed a low level of knowledge for many participants, which was also reflected in practice, as suctioning was performed against many of the research recommendations. Following teaching, significant improvements were seen in both knowledge and practice. Four weeks later these differences were generally sustained, and provide evidence of the effectiveness of the educational intervention. The study raised concern about all aspects of endotracheal suctioning and highlighted the need for changes in nursing practice, with clinical guidelines and focused practice-based education.

Cernomaz TA, Bolog SG (**2008)** A structured observational study was done to investigate open system endotracheal suctioning (ETS) practices of critical care nurses. Specific objectives were to examine nurses' practices prior to, during and post-ETS and to compare nurses' ETS practices with current research recommendations. ETS is a potentially harmful procedure that, if performed

inappropriately or incorrectly, might result in life-threatening complications for patients. The literature suggests that critical care nurses vary in their suctioning practices; however, the evidence is predominantly based on retrospective studies that fail to address how ETS is practiced on a daily basis. The study samples consist of critical care nurses (n = 45). The study result shows that participants varied in their ETS practices; did not adhere to best practice suctioning recommendations; and consequently provided lower-quality ETS treatment than expected. Significant discrepancies were observed in the participants' respiratory assessment techniques, hyperoxygenation and infection control practices, patient reassurance and the level of negative pressure used to clear secretions. The findings suggest that critical care nurses do not adhere to best practice recommendations when performing ETS and need to educate for best practice.

Nargies asgari (2008) A descriptive study was done to assess the institutional policies and procedures related to closed-system suctioning and airway management of intubated patients, and to compare practices of registered nurses and respiratory therapists. A descriptive, comparative, multisite study of facilities that use closed-system suctioning devices on most intubated adults was conducted. Nurses and respiratory therapists who worked at the sites completed surveys related to their practices. A total of 1665 nurses and respiratory therapists at 27 sites throughout the United States responded. The typical respondent had at least 6 years' experience with patients receiving mechanical ventilation (61%) and a baccalaureate degree or higher (54%). Most sites had policies for management of endotracheal tube cuffs (93%), hyperoxygenation (89%) and use of gloves (70%) with closed-system suctioning, and instillation of isotonic sodium chloride solution for thick secretions (74%). Only 48% of policies addressed oral care and 37% addressed oral suctioning. Nurses did more oral suctioning and oral care than respiratory therapists did, and respiratory therapists instilled sodium chloride solution more and rinsed the suctioning device more often than nurses did. The study result concluded that consistent performance of practices such as wearing gloves for airway management and maintaining endotracheal cuff pressures must

be evaluated. Collaborative, research-based policies and procedures must be developed and implemented to ensure best practices for intubated patients.

Castelino et al., (2009) a descriptive comparative design was used to determine current practice and differences in practices between registered nurses and respiratory therapists in managing patients receiving mechanical ventilation. A convenience sample of 41 registered nurses and 25 respiratory therapists, who manage critical care patients treated with mechanical ventilation at Sharp Grossmont Hospital, completed a survey on suctioning techniques and airway management practices. Descriptive and inferential statistics were used to analyze the data. The study result shows that Significant differences existed between nurses and respiratory therapists for hyper oxygenation before suctioning (P =.03). In the 2 groups, nurses used the ventilator for hyper-oxygenation more often, and respiratory therapists used a bag-valve device more often (P =.03). Respiratory therapists instilled saline (P <.001) and rinsed the closed system with saline after suctioning (P =.003) more often than nurses did. Nurses suctioned oral secretions (P <.001) and the nose of orally intubated patients (P =.01), brushed patients' teeth with a toothbrush (P<.001), and used oral swabs to clean the mouth (P <.001) more frequently than respiratory therapists did. The study concluded that nurses and respiratory therapists differed significantly in the management of patients receiving mechanical ventilation. To reduce the risk of ventilator-associated pneumonia, both nurses and respiratory therapists must be consistent in using best practices when managing patients treated with mechanical ventilation.

Chettinkaya et al., (2009) A comparative study was done to compare the closed tracheal suction system and the open tracheal suction system in adults receiving mechanical ventilation for more than 24 hours. The review included (1684 patients. The two tracheal suction systems showed no differences in risk of ventilator-associated pneumonia (11 trials; RR 0.88; 95% CI 0.70 to 1.12), mortality (five trials; RR 1.02; 95% CI 0.84 to 1.23) or length of stay in intensive care units (two trials; WMD 0.44; 95% CI -0.92 to 1.80). The closed tracheal

suction system produced higher bacterial colonization rates (five trials; RR 1.49; 95% CI 1.09 to 2.03). The result concluded that; either closed or open tracheal suction systems did not have an effect on the risk of ventilator-associated pneumonia or mortality

Winston and Carolin (2010) an experimental study design was adopted (pretest, post test design with control). A directional hypothesis was formulated as there is significant difference in maintenance of physiological parameters in favour of modified standard endotracheal suctioning technique and current technique. A control group was used with hospital protocol as a comparison. Recording of physiological parameters (HR, Sp02, MAP) were carried out in time series manner. An observational checklist was maintained in order to record the steps of the procedure. The difference in effectiveness was demonstrated by student "t" -test and paired "t" -test. The study reveals that modified standard endotracheal suctioning technique is effective in maintaining desired level of physiological parameters. It was found that there is increase in Sp02 after intervention. This study recommends modified standard endotracheal suctioning technique as a tool to enhance patient's safety and to promote recovery. The diffusion of this study results among clinical nurses will enhance quality care as evidence based practice promotes professionalism and excellence.

Dr.Majid Mohamed and Parvin (20011) A study was done to investigate the effects of endotracheal suction in volume-controlled ventilation (VCV) and pressure-controlled ventilation (PCV) with an open suction system (OSS) or a closed suction system (CSS). The effects of endotracheal suction during VCV and PCV with tidal volume (VT) of 14 mL/kg were compared. A 60-mm inner-diameter endotracheal tube was used. Ten-second suction was performed using OSS and CSS with 12F and 14F catheters connected to − 14 kPa vacuum. The result shows that; thirty minutes after suction in PCV, VT was still decreased by 27% ($p < 0.001$), compliance by 28% ($p < 0.001$), and PaO_2 by 26% ($p < 0.001$); $PaCO_2$ was increased by 42% ($p < 0.0001$) and venous admixture by 158% ($p =$

0.003). Suction in VCV affected only (decreased by 23%, $p < 0.001$) and plateau pressure (increased by 24%, $p < 0.001$). The initial impairment of gas exchange following suction in VCV was no longer statistically significant after 30 min. The study concluded that endotracheal suction causes lung collapse leading to impaired gas exchange, an effect that is more severe and persistent in PCV than in VCV.

Meera and Samsion (2011) conduucted a evaluative study was done to assess Instillation of isotonic sodium chloride solution for endotracheal tube suctioning is beneficial or not. Research has focused on the effect of such instillation in adults; no studies in children have been published. A convenience sample of 24 critically ill patients was enrolled before having suctioning and after informed consent had been given. Ages ranged from 10 weeks to 14 years. Patients were randomized to 1 of 2 groups. In group 1, subjects received between 0.5 and 2.0 ml of isotonic sodium chloride solution, depending on their age, once per suctioning episode. In group 2, subjects received no such solution. A total of 104 suctioning episodes were analyzed. Oxygen saturation was recorded at predetermined intervals before and for 10 minutes after suctioning. Occlusion of endotracheal tubes and rates of nosocomial pneumonia also were compared. The study result shows that; Patients who had isotonic sodium chloride solution instilled experienced significantly greater oxygen desaturation 1 and 2 minutes after suctioning than did patients who did not. No occlusions of endotracheal tubes and no cases of nosocomial pneumonia occurred in either group. The study concluded that instillation of isotonic sodium chloride solution during endotracheal tube suctioning may not be beneficial and actually may be harmful.

Christina (2011) conducted a study was done to assess the use of isotonic sodium chloride solution on endotracheal suctioning in critically ill patients. The use of isotonic sodium chloride on endotracheal suctioning is still commonly performed in intensive care units (ICUs). According to the studies, isotonic sodium chloride instillation may decrease oxygen saturation, increased

intracranial pressure, arterial blood pressure, and cause cardiac dysrhythmias, cardiac arrest, respiratory arrest, and nosocomial infection. Endotracheal suctioning should not be used as a routine or standard clinical practice because of these negative effects. This article reviews effects of isotonic sodium chloride solution before endotracheal suctioning of mechanically ventilated patients.

CHAPTER – III

METHODOLOGY

This chapter deals with the methodology adopted for the study. It includes the research design variable settings and population, sample size, criteria for selection of the sample, sampling technique, development and description of the instruments and validity data collection procedure , pilot study and data analysis.

RESEARCH APPROACH

Research approach used for this study is quantitative approach.

RESEARCH DESIGN

Research design chosen for this study is non randomized clinical trial, time series study.

VARIABLES

Independent Variables:

Open and Closed suction methods.

Dependent Variables:

Cardio respiratory parameters.

SETTING OF THE STUDY

This study was conducted in Fortis Malar Hospital, Chennai. It is 250 bedded multispecialty hospital with various department and specialization. In that 10 bedded Medical ICU, 17 bedded Cardiac Thoracic ICU, 8 bedded coronary ICU, 7 bedded Neuro ICU, with over all in-patient turnover of 100-150 patients a month.

POPULATION

Target Population

All patients who are admitted with mechanical ventilator in ICU

Accessible Population

The study comprises of all mechanical ventilators patients who are admitted in ICUs who fulfills the sample selection criteria.

SAMPLE

Patients those who are admitted in ICU and in mechanical ventilators and who fill the sample inclusion criteria.

CRITERIA FOR SAMPLE SELECTION

Inclusive Criteria

1. Aged more than 20-69 years.
2. Those who are admitted in Neuro-ICU and Medical ICU with ventilator support.

Exclusive Criteria

1. Patient with lung injury and cardiac surgery.
2. Patient who is not willing to participate for this study.

SAMPLING TECHNIQUE

Purposive sampling technique

SAMPLE SIZE

Total 40 samples were selected from that 20 for open suction, 20 for closed suction

DEVELOPMENT AND DESCRIPTION OF INSTRUMENT

Data collection contain section A and section B

Section A: It consists of demographic variable such as age, sex, type of ICU, education, duration of suction.

Section B : It consists of respiratory parameter was assessed before and during suction such as respiratory rate, heart rate, mean arterial pressure, spo2.

CONTENT VALIDITY

Content validity of the tool was obtained from 5 experts among them 3 were nursing, 2 were in charge of critical care department. Based on their suggestion and modification of the tool was done.

PILOT STUDY

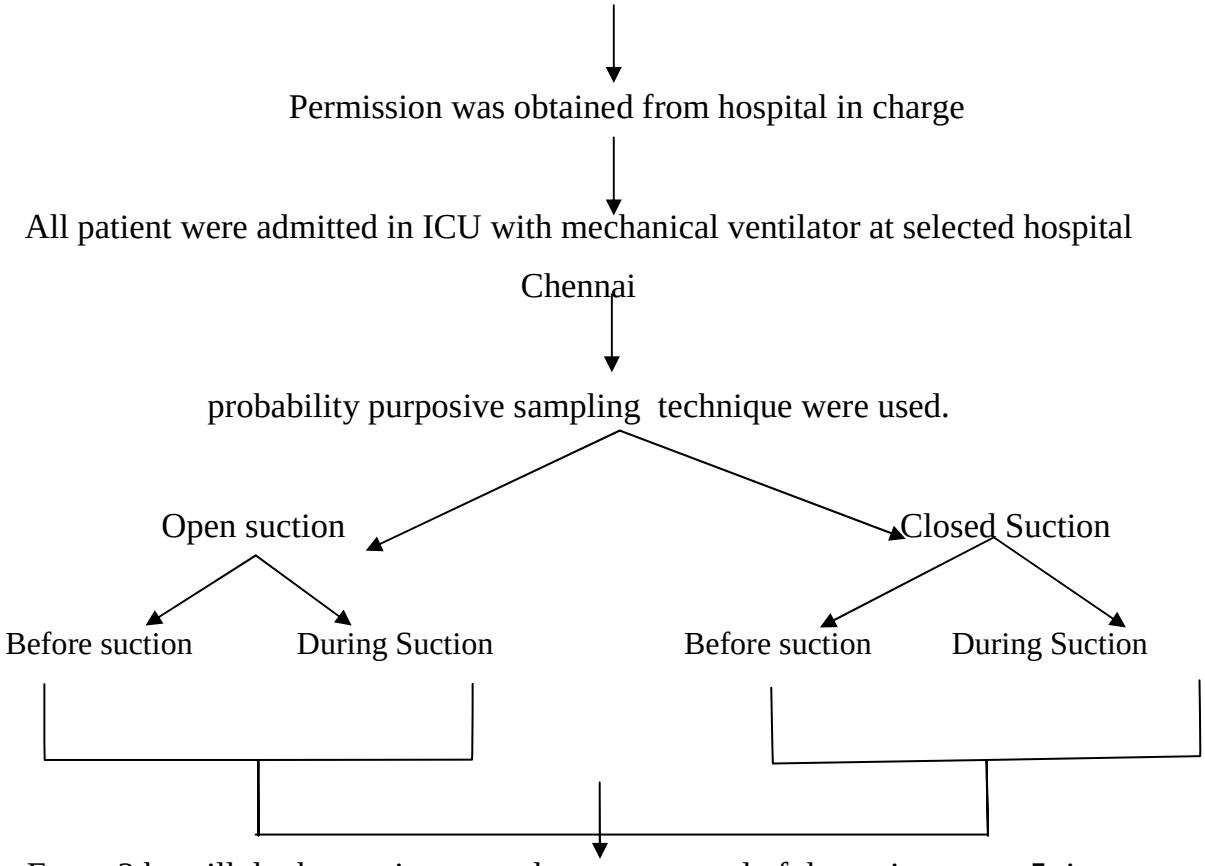
Ethical clearance was obtained from ethical committee of Indira College of Nursing. After getting content Validity from nursing, medical and research expert the pilot study was conducted in Malar Hospital, Chennai between the period of 10-5 2013 to 14-5-2013. Four patients who met sample selection criteria was selected by purposive sampling technique. During pilot study, practicability and feasibility was checked. The reliability of the tool was checked .the reliability of the tool was established by the inter rater method. The value was 0.9. It was highly reliable.

ETHICAL CONSIDERATION

Informed consent was obtained from the sample’s bystanders. The bystanders were assured confidentiality of the data obtained.

DATA COLLECTION PROCEDURE

After obtaining the permission from principal of Indira College of Nursing and the administration of Malar Hospital, Chennai. The main study was conducted from 10-5-2013 to 8-6-2013 for four weeks



PLAN FOR DATA ANALYSIS

Data analysis is the systemic organization of research data and the finding of the result. The data obtained was analyzed by both descriptive and inferential statistics on both basis of objective and hypothesis of the study.

Descriptive Statistics

Frequency and percentage distribution was used to analyze the demographic variables.

Inferential Statistics:

1. Student paired t- test used to assess the effectiveness of open and closed suction system on cardio respiratory parameter.
2. Student independent t-test use to assess the comparison before and during cardio respiratory parameter on open and closed suction.
3. Chi- square used to associate the cardio respiratory parameter with demographic variables.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

The process of organizing and synthesizing the data in such a way that the research question can be answered and hypotheses are tested known as analysis **(Polit and Hungler, 2010).**

This chapter deals with the analysis and interpretation of data collected from 40 from patient who is admitted with mechanical ventilators . The data was organized, tabulated and analyzed according to the objectives. The findings based on the descriptive and inferential statistical analysis are presented under the following sections.

ORGANIZATION OF THE DATA

Section- A: Description of mechanical ventilator patient based on demographic variables.

Section B: Assess the effectiveness of open suction Vs Cardio-respiratory parameter.

Section C: Assess the effectiveness of closed suction Vs cardio respiratory parameter

Section D: Compare the open suction and closed suction method with cardio respiratory parameters

Section E: Associate the selected demographic variables with the cardio respiratory parameters

SECTION A: DESCRIPTION OF MECHANICAL VENTILATORS PATIENTS BASED ON DEMOGRAPHIC VARIABLES.

Table 1 : Frequency and percentage distribution of demographic variable in open and closed suction

N=40

Demographic variables		Group				Chi square test
		Open Suction		Closed Suction		
		N	%	n	%	
Age	20 - 25 yrs	5	25.0%	6	30.0%	χ^2=0.23 p=0.97
	26 - 30 yrs	7	35.0%	7	35.0%	
	31 - 35 yrs	4	20.0%	3	15.0%	
	>35 yrs	4	20.0%	4	20.0%	
Sex	Male	10	50.0%	12	60.0%	χ^2=0.40 p=0.52
	Female	10	50.0%	8	40.0%	
Education	Primary	5	25.0%	7	35.0%	χ^2=2.06 p=0.55
	HSc	5	25.0%	7	35.0%	
	Graduate	5	25.0%	4	20.0%	
	Post graduate	5	25.0%	2	10.0%	
Type of ICU	NICU	8	40.0%	13	65.0%	χ^2=2.52 p=0.11
	IMCU	12	60.0%	7	35.0%	
Duration of suction	1 - 2 sec	6	30.0%	9	45.0%	χ^2=0.96 p=0.32
	3 - 5 sec	14	70.0%	11	55.0%	

Table 1 shows that in the open suction group majority of the patients were 7(35%) 26-30 years of age,10(50%) male,10(50%) female,5(25%) were had primary education 5(25%) higher secondary education, 5(25%)were graduates, 5(25%)were post graduates, 12(60%) were in IMCU, 14(70%)were 3-5 second of duration of suction done to the patients .

Whereas in closed suction group majority of the patients 7(35%) were in 26-30 years 12(60%) males, 7(35) had primary education, 7(35%) higher secondary education, 13(65%) in NICU, 11(55%) were 3-5 second duration of suction was done to the patients.

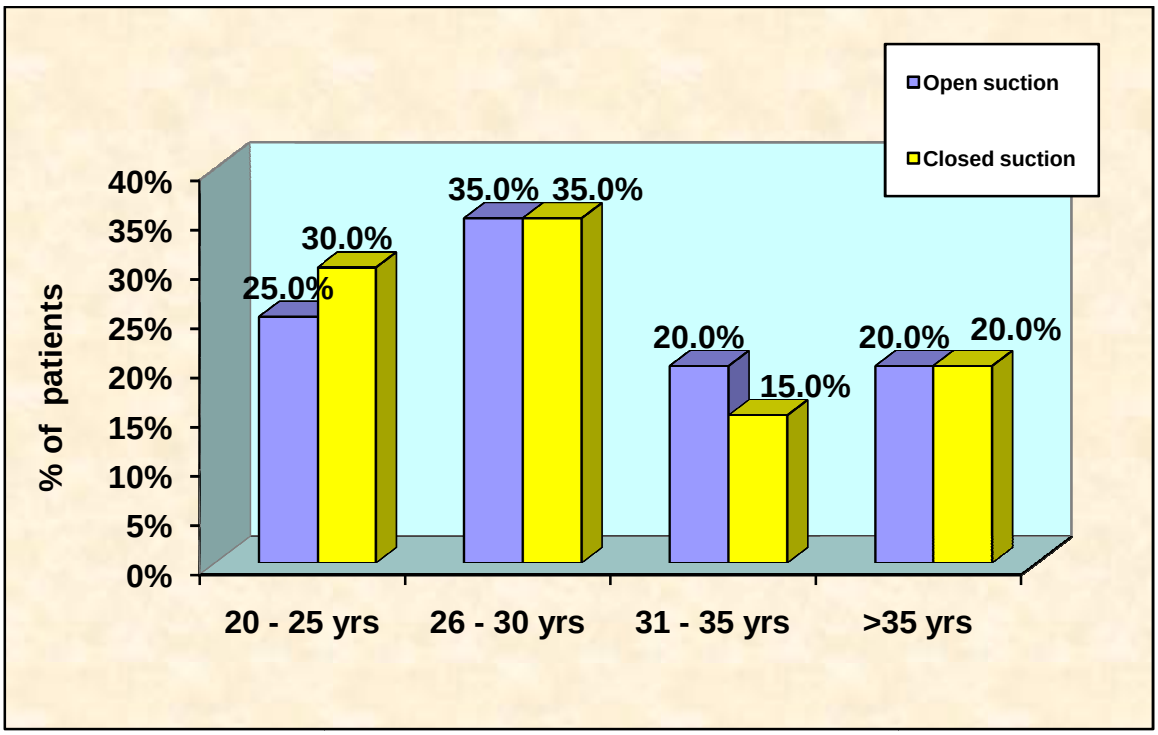


Figure 2: Frequency and percentage distribution of age group in open and closed suction

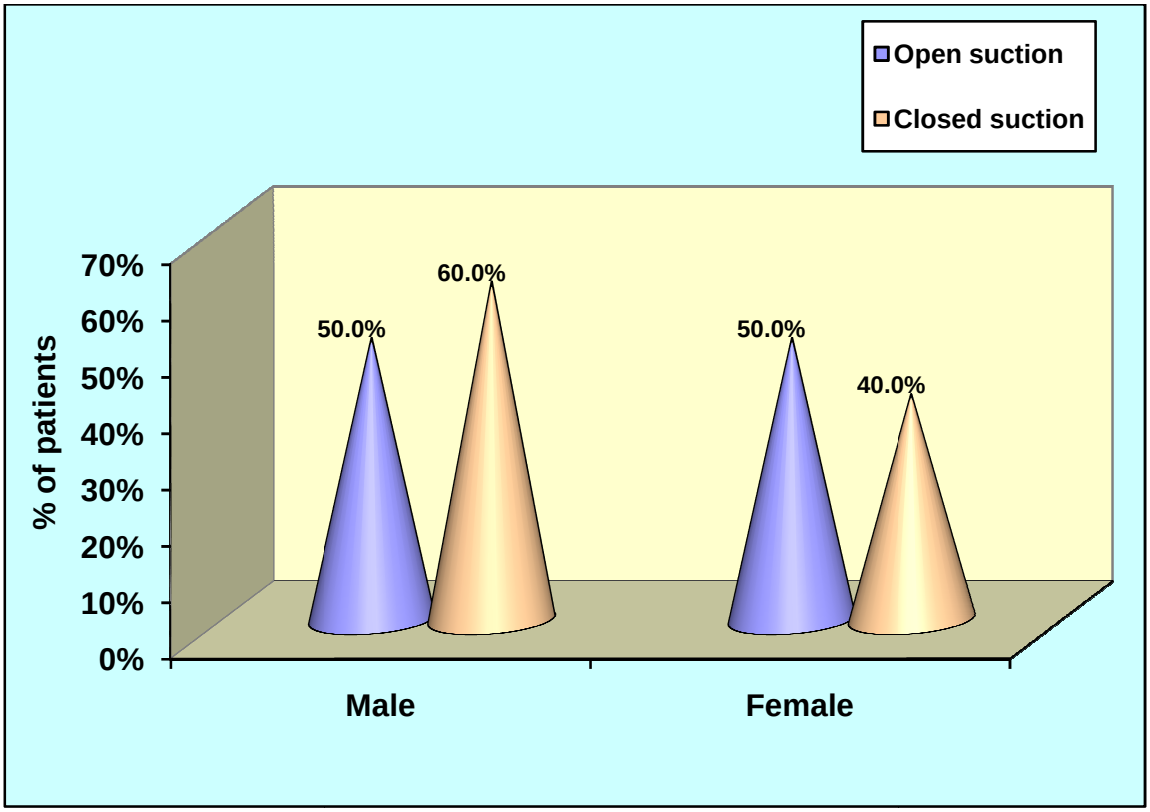


Figure 3: Frequency and percentage distribution of sex in open and closed suction

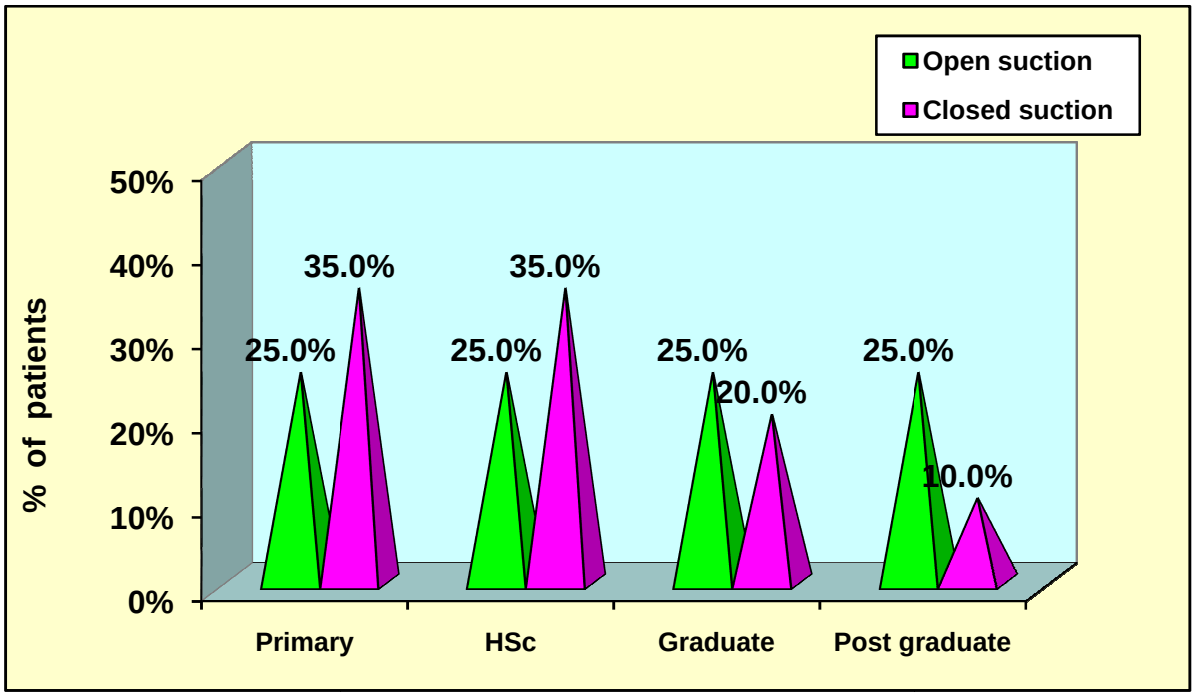


Figure 4: Frequency and percentage distribution of education in open and closed suction

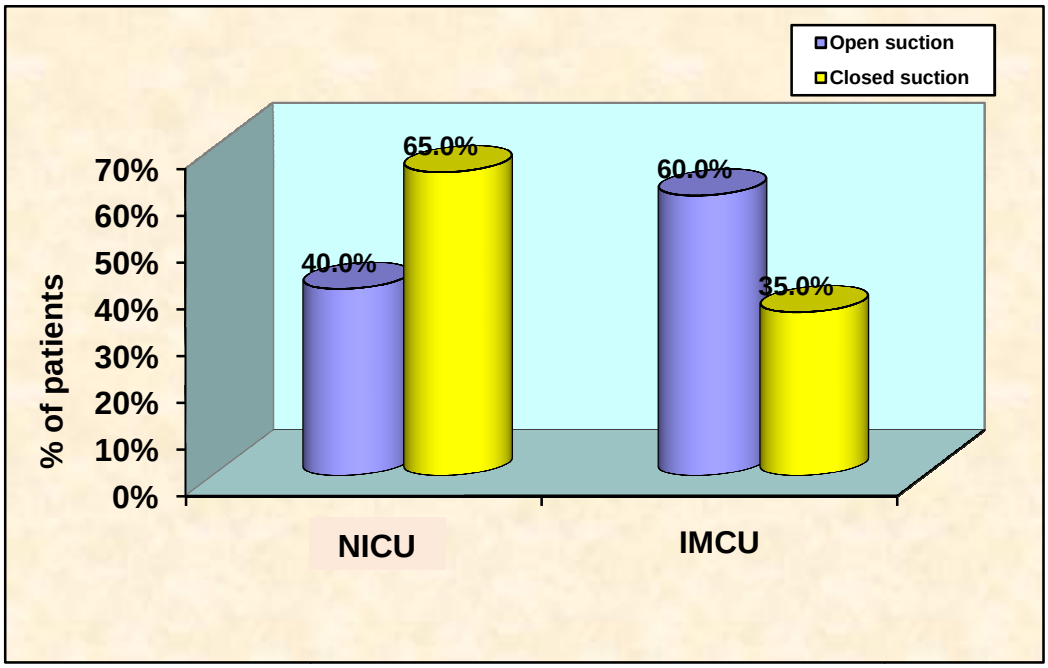


Figure 5: Frequency and percentage distribution of types of ICU in open and closed suction

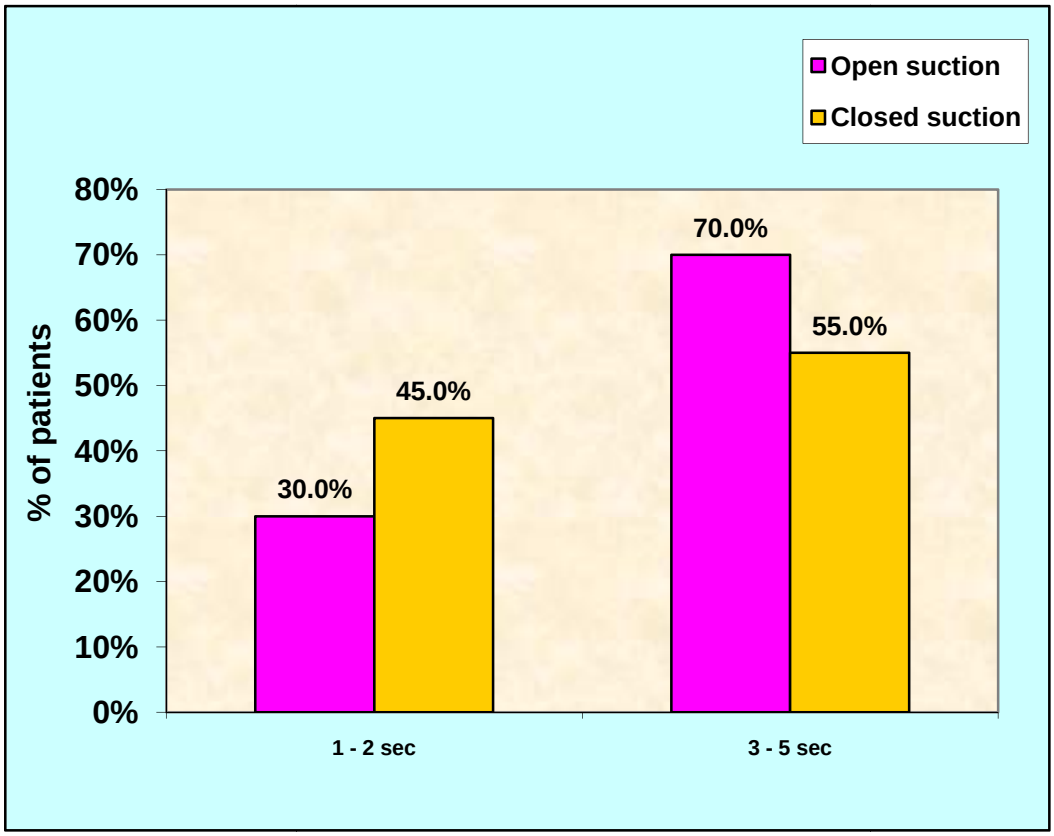


Figure 6: Frequency and percentage distribution of duration of suction in open and closed suction

SECTION B: TO ASSESS THE EFFECTIVENESS OF OPEN SUCTION ON CARDIO RESPIRATORY PARAMETERS

Table 2 : Comparison of heart rate mean and standard deviation of Open suction method patients with mechanical ventilators.

n =20

Criteria	Group				Paired t-test
	Before suction		During suction		
	Mean	SD	Mean	SD	
hr1	97.30	8.62	104.30	8.06	t=5.55 p=0.001***
hr2	93.20	6.14	101.90	6.27	t=7.61 p=0.001***
hr3	93.50	4.94	101.25	5.46	t=7.75 p=0.001***
hr4	94.60	7.14	99.20	6.82	t=4.60 p=0.001***
hr5	93.20	8.22	99.20	8.81	t=6.00 p=0.001***

Table 2 shows that before open suction Heart rate was 97.30 and during open suction heart rate was 104.30, so the difference is 7, which is difference is large and statistically significant.

Table 3: Comparison of oxygen saturation mean and standard deviation for Open suction method patients with mechanical ventilators.

n=20

Criteria	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
ox1	98.00	1.12	96.00	.65	t=7.96 p=0.001***
ox2	98.60	.94	95.60	1.79	t=9.74 p=0.001***
ox3	98.70	1.17	95.70	.98	t=13.07 p=0.001***
ox4	98.70	1.34	95.70	1.34	t=11.05 p=0.001***
ox5	98.40	.82	95.60	1.54	t=9.20 p=0.001***

Table 3 shows that before open suction oxygen saturation is 98.00 and during open suction oxygen saturation is 96.00 , so the difference is 2, this difference is large and statistically significant.

Table 4: Comparison of respiration rate mean and standard deviation Open suction method patient with mechanical ventilators (Open suction)

n=20

Criteria	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
rr1	19.50	1.82	22.20	1.58	t=12.33 p=0.001***
rr2	19.10	2.00	21.50	1.93	t=10.25 p=0.001***
rr3	18.20	1.28	21.30	1.17	t=10.10 p=0.001***
rr4	18.90	2.79	21.90	1.89	t=6.38 p=0.001***
rr5	19.90	2.00	22.30	2.08	t=6.99 p=0.001***

Table 4 shows that before open suction respiration rate is 19.50 and during open suction respiration rate is 22.20, so the difference is 2.7, this difference is large and statistically significant.

Table 5: Comparison of MAP mean and standard deviation for Open suction method patient with mechanical ventilators (Open suction)

n = 20

Criteria	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
MAP1	101.15	7.77	116.80	10.06	t=10.43 p=0.001***
MAP2	99.70	7.03	115.20	9.23	t=10.25 p=0.001***
MAP3	104.00	6.87	117.75	9.73	t=10.10 p=0.001***
MAP4	107.00	11.21	113.40	7.82	t=6.38 p=0.001***
MAP5	104.30	7.00	117.90	8.74	t=6.99 p=0.001***

Table 5 shows that before open suction MAP is 101.15 and during open MAP is 116.80, so the difference is 15.65, this difference is large and statistically significant

Table 6: Effectiveness of Open suction before suction and during suction method on cardio respiratory parameters among patients with mechanical ventilators.

N = 20

	Before	During	Difference
Heart rate	97.30	99.20	1.90
Oxygen saturation	98.00	95.60	2.40
Respiratory rate	19.50	22.30	2.80
MAP	101.15	117.90	16.75

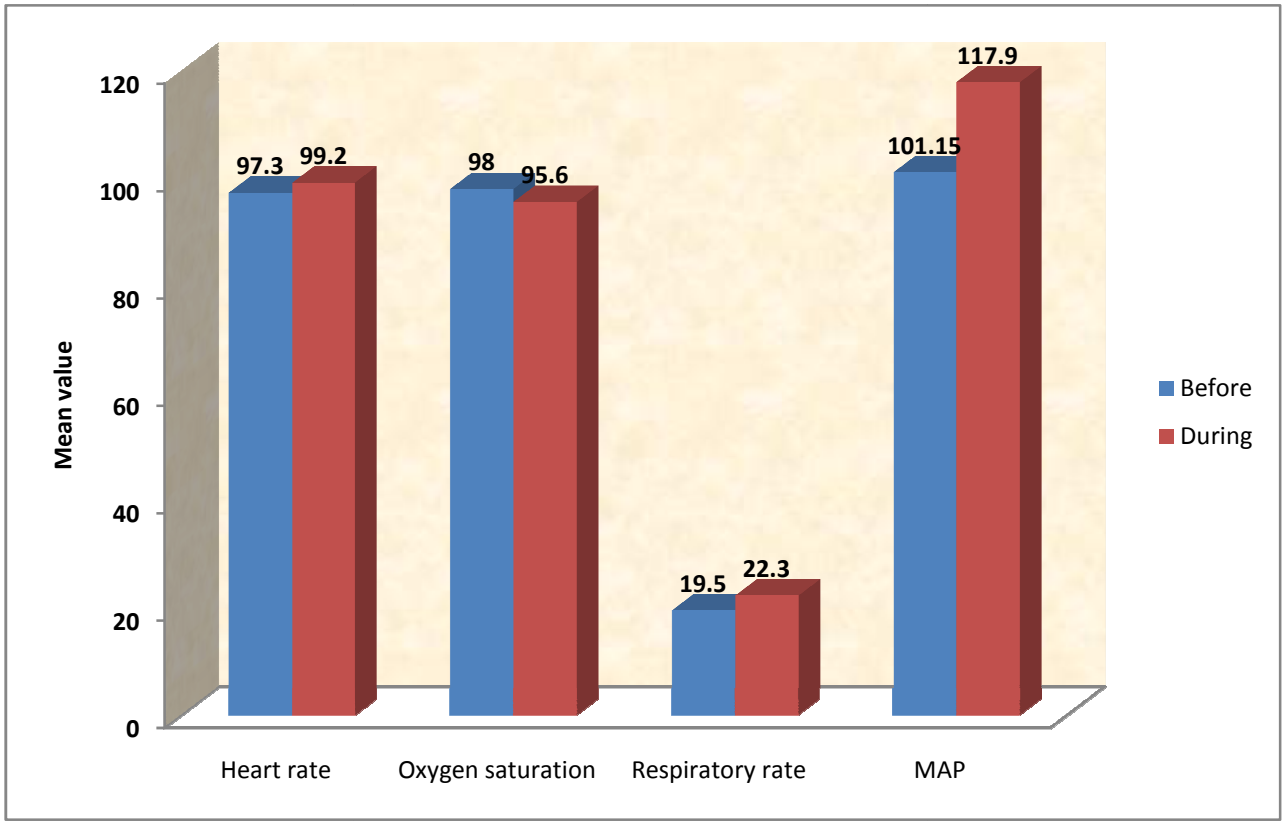


Figure 7: Cardio Respiratory Parameter changes (Open)

SECTION C: TO ASSESS THE EFFECTIVENESS OF CLOSED SUCTION AND CARDIO RESPIRATORY PARAMETERS.

Table 7 : Comparison of heart rate mean and standard deviation of closed suction method patients with mechanical ventilators.

n =20

	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
hr1	97.50	8.53	97.50	8.53	t=0.00 p=1.00
hr2	93.00	6.03	93.00	6.03	t=0.00 p=1.00
hr3	93.50	4.94	93.50	4.94	t=0.00 p=1.00
hr4	94.60	7.14	94.60	7.14	t=0.00 p=1.00
hr5	93.20	8.22	93.20	8.22	t=0.00 p=1.00

Table 7 shows that before closed suction Heart rate is 97.50 and during closed suction heart rate is 97.50, so the difference is 0, and statistically not significant

Table 8: Comparison of oxygen saturation mean and standard deviation of closed suction patients with mechanical ventilators

n = 20

	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
ox1	97.50	8.53	98.00	1.12	t=0.26, p=0.79
ox2	93.00	6.03	98.60	.94	t=3.86, p=0.001***
ox3	93.50	4.94	98.70	1.17	t=4.67, p=0.001***
ox4	94.60	7.14	98.70	1.34	t=2.6,1 p=0.001***
ox5	93.20	8.22	98.40	.82	t=2.81, p=0.001***

Table 8 shows that before closed suction oxygen saturation is 97.50 and during open suction oxygen saturation is 98.00, so the difference is 0.5, this difference is small and statistically not significant.

Table 9: Comparison of respiration rate mean and standard deviation of closed suction method patient with mechanical ventilators.

n =20

	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
rr1	19.50	1.82	19.50	1.82	t=0.00, p=1.00
rr2	19.10	2.00	19.10	2.00	t=0.00, p=1.00
rr3	18.20	1.28	18.20	1.28	t=0.00, p=1.00
rr4	18.90	2.79	18.90	2.79	t=0.00, p=1.00
rr5	19.90	2.00	19.90	2.00	t=0.00, p=1.00

Table 9 shows that before closed suction respiration rate is 19.50 and during open suction heart rate is 19.50, so the difference is 0, and statistically not significant.

Table 10: Comparison of MAP mean and standard deviation of closed suction method patient with mechanical ventilators.

n =20

	Group				Paired t-test
	Before		During		
	Mean	SD	Mean	SD	
MAP1	101.15	7.77	101.15	7.77	t=0.00, p=1.00
MAP2	99.70	7.03	99.70	7.03	t=0.00, p=1.00
MAP3	104.00	6.87	104.00	6.87	t=0.00, p=1.00
MAP4	107.00	11.21	107.00	11.21	t=0.00, p=1.00
MAP5	104.30	7.00	104.30	7.00	t=0.00, p=1.00

Table 10 shows that before closed suction respiration rate is 101.15and during closed suction heart rate is 101.15, so the difference is 0, and statistically not significant.

Table 11: Effectiveness of Closed suction methods on cardio respiratory parameters before and during suction among patient with mechanical ventilators.

n =20

	Before	During	Difference
Heart rate	97.50	93.20	4.30
Oxygen saturation	97.50	98.40	0.90
Respiratory rate	19.50	19.90	0.40
MAP	101.15	104.30	2.8

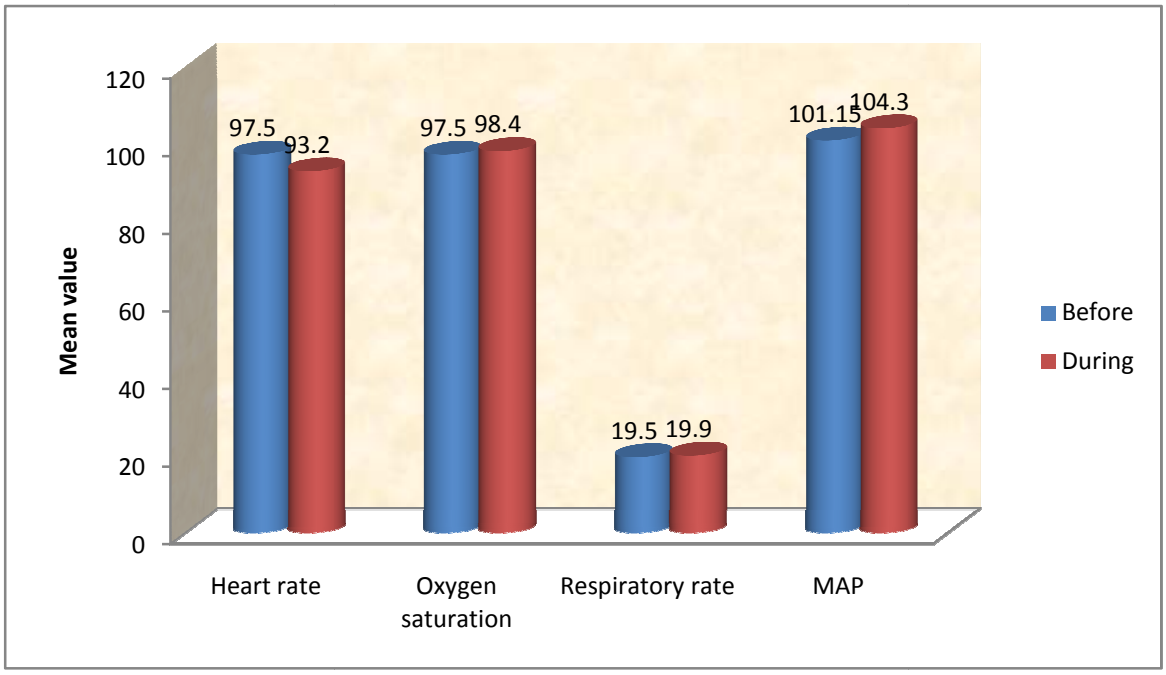


Figure 8: Cardio Respiratory Parameter changes (closed)

Table 12: Comparison of heart rate in open suction and closed suction method with cardio respiratory parameter.

N=40

		Group				Independent t-test
		Open suction		Closed suction		
		Mean	SD	Mean	SD	
	hr1	97.30	8.62	97.50	8.53	t=0.00, p=1.00
Before	hr2	93.20	6.14	93.00	6.03	t=0.10, p=0.91
	hr3	93.50	4.94	93.50	4.94	t=0.00, p=1.00
	hr4	94.60	7.14	94.60	7.14	t=0.00, p=1.00
	hr5	93.20	8.22	93.20	8.22	t=0.00, p=1.00
During	hr1	104.30	8.06	97.50	8.53	t=2.59, p=0.01**
	hr2	101.90	6.27	93.00	6.03	t=4.57, p=0.001***
	hr3	101.25	5.46	93.50	4.94	t=4.70, p=0.001***
	hr4	99.20	6.82	94.60	7.14	t=2.09, p=0.04*
	hr5	99.20	8.81	93.20	8.22	t=2.22, p=0.03*

Table 12 shows that there is no significant difference between open suction and closed suction before suction.

There is a significant difference between open suction and closed suction during suction.

Table 13: Comparison of oxygen saturation open suction and closed suction method and cardio respiratory parameters.

N =40

		Group				**Independent t-test**
		Open suction		**Closed suction**		
		Mean	**SD**	**Mean**	**SD**	
Before	ox1	98.00	1.12	97.50	8.53	t=0.26, p=0.76
	ox2	98.60	.94	93.00	6.03	t=4.10, p=0.001
	ox3	98.70	1.17	93.50	4.94	t=4.58, p=0.001
	ox4	98.70	1.34	94.60	7.14	t=2.52, p=0.01
	ox5	98.40	.82	93.20	8.22	t=2.81, p=0.01
During	ox1	96.00	.65	98.00	1.12	t=6.89, p=0.001***
	ox2	95.60	1.79	98.60	.94	t=6.63, p=0.001***
	ox3	95.70	.98	98.70	1.17	t=8.77, p=0.001***
	ox4	95.70	1.34	98.70	1.34	t=7.07, p=0.001***
	ox5	95.60	1.54	98.40	.82	t=7.19, p=0.001***

Table 13 shows that there is a significant difference between open suction and closed suction during suction.

Table 14: Comparison of respiratory rate in open suction and closed suction method and cardio respiratory parameter

N=40

		Group				Independent t-test
		Open suction		Closed suction		
		Mean	SD	Mean	SD	
Before	rr1	19.50	1.82	19.50	1.82	t=0.00, p=1.00
	rr2	19.10	2.00	19.10	2.00	t=0.00, p=1.00
	rr3	18.20	1.28	18.20	1.28	t=0.00, p=1.00
	rr4	18.90	2.79	18.90	2.79	t=0.00, p=1.00
	rr5	19.90	2.00	19.90	2.00	t=0.00, p=1.00
After	rr1	22.20	1.58	19.50	1.82	t=5.01, p=0.001***
	rr2	21.50	1.93	19.10	2.00	t=3.86, p=0.001***
	rr3	21.30	1.17	18.20	1.28	t=7.97, p=0.001***
	rr4	21.90	1.89	18.90	2.79	t=3.98, p=0.001***
	rr5	22.30	2.08	19.90	2.00	t=3.72, p=0.001***

Table 14 shows that there is no significant difference between open suction and closed suction before suction.

There is a significant difference between open suction and closed suction on during suction.

Table 15: Comparison of MAP open suction and closed suction method an cardio respiratory parameters.

N=40

		Group				Independent t-test
		Open suction		Closed suction		
		Mean	SD	Mean	SD	
Before	MAP1	101.15	7.77	101.15	7.77	t=0.00, p=1.00
	MAP2	99.70	7.03	99.70	7.03	t=0.00, p=1.00
	MAP3	104.00	6.87	104.00	6.87	t=0.00, p=1.00
	MAP4	107.00	11.21	107.00	11.21	t=0.00, p=1.00
	MAP5	104.30	7.00	104.30	7.00	t=0.00, p=1.00
During	MAP1	116.80	10.06	101.15	7.77	t=5.51, p=0.001***
	MAP2	115.20	9.23	99.70	7.03	t=5.96, p=0.001***
	MAP3	117.75	9.73	104.00	6.87	t=5.17, p=0.001***
	MAP4	113.40	7.82	107.00	11.21	t=2.09, p=0.04*
	MAP5	117.90	8.74	104.30	7.00	t=5.43, p=0.001***

Table 15 shows that there is no significant difference between open suction and closed suction on before suction.

There is a significant difference between open suction and closed suction on during suction.

SECTION D: TO ASSOCIATE THE SELECTED DEMOGRAPHIC VARIABLES WITH CARDIO RESPIRATORY PARAMETER AMONG PATIENT WITH MECHANICAL VENTILATION

Table 16 : Association between Level of Heart rate change and demographic variables (open suction)

n = 20

		Heart rate changes				Total	Chi square test
		Below average(<-1.90)		Above average(>-1.90)			
		n	%	n	%		
Age	20 - 25 yrs	3	60.0%	2	40.0%	5	χ^2=2.48 p=0.47
	26 - 30 yrs	2	28.6%	5	71.4%	7	
	31 - 35 yrs	2	50.0%	2	50.0%	4	
	>35 yrs	3	75.0%	1	25.0%	4	
Sex	Male	7	70.0%	3	30.0%	10	**χ^2=7.20 p=0.01***
	Female	3	30.0%	7	70.0%	10	
Education	Primary	1	20.0%	4	80.0%	5	χ^2=4.00 p=0.26
	HSC	2	40.0%	3	60.0%	5	
	Graduate	4	80.0%	1	20.0%	5	
	Post graduate	3	60.0%	2	40.0%	5	
Type of ICU	CCU	4	50.0%	4	50.0%	8	χ^2=0.00 p=1.00
	IMCU	6	50.0%	6	50.0%	12	
Duration of suction	1 - 2 sec	4	66.7%	2	33.3%	6	χ^2=0.39 p=0.53
	3 - 5 sec	6	42.9%	8	57.1%	14	

Table 16 shows the association between open suction heart rate changes and demographic variables. Females are having significant changes at P=0.01.

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Table 17: Association between Level of Oxygen saturation changes and demographic variables (open suction)

n =20

		Oxygen saturation changes				Total	Chi square test
		Below average (<-2.40)		Above average (>-2.40)			
		n	%	n	%		
Age	20 - 25 yrs	2	40.0%	3	60.0%	5	χ^2=2.48 p=0.47
	26 - 30 yrs	3	42.9%	4	57.1%	7	
	31 - 35 yrs	3	75.0%	1	25.0%	4	
	>35 yrs	2	50.0%	2	50.0%	4	
Sex	Male	5	50.0%	5	50.0%	10	χ^2=0.00 p=1.00
	Female	5	50.0%	5	50.0%	10	
Education	Primary	1	20.0%	4	80.0%	5	χ^2=4.00 p=0.26
	HSC	2	40.0%	3	60.0%	5	
	Graduate	3	60.0%	2	40.0%	5	
	Post graduate	4	80.0%	1	20.0%	5	
Type of ICU	NICU	3	37.5%	5	62.5%	8	χ^2=0.83 p=0.36
	IMCU	7	58.3%	5	41.7%	12	
Duration of suction	1 - 2 sec	5	83.3%	1	16.7%	6	**χ^2=3.84 p=0.05***
	3 - 5 sec	5	35.7%	9	64.3%	14	

Table 17 shows the association between heart rate changes and demographic variables. 3-5 sec duration of suction patients are having significant changes.

Table 18: Association between Level of Respiratory rate changes and demographic variables (open suction)

n = 20

		Respiratory rate changes				Total	Chi square test
		Below average (<-2.80)		Above average (>-2.80)			
		n	%	n	%		
Age	20 - 25 yrs	1	20.0%	4	80.0%	5	χ^2=3.08 p=0.37
	26 - 30 yrs	5	71.4%	2	28.6%	7	
	31 - 35 yrs	2	50.0%	2	50.0%	4	
	>35 yrs	2	50.0%	2	50.0%	4	
Sex	Male	4	40.0%	6	60.0%	10	χ^2=0.80 p=0.37
	Female	6	60.0%	4	40.0%	10	
Education	Primary	2	40.0%	3	60.0%	5	χ^2=0.80 p=0.86
	HSC	3	60.0%	2	40.0%	5	
	Graduate	3	60.0%	2	40.0%	5	
	Post graduate	2	40.0%	3	60.0%	5	
Type of ICU	NICU	3	37.5%	5	62.5%	8	χ^2=0.83 p=0.36
	IMCU	7	58.3%	5	41.7%	12	
Duration of suction	1 - 2 sec	5	83.3%	1	16.7%	6	**χ^2=3.84 p=0.05***
	3 - 5 sec	5	35.7%	9	64.3%	14	

Table 18 shows the association between respiratory rate changes and demographic variables. 3-5 sec duration of suction patients are having significant changes.

Table 19: Association between Level of MAP changes and demographic variables (open suction)

n = 20

		MAP changes				Total	Chi square test
		Below average (<-16.75)		Above average (>-16.75)			
		n	%	n	%		
Age	20 - 25 yrs	0	20.0%	5	80.0%	5	**χ^2=14.28 p=0.01****
	26 - 30 yrs	0	57.1%	5	42.9%	7	
	31 - 35 yrs	4	50.0%	0	50.0%	4	
	>35 yrs	4	75.0%	0	25.0%	4	
Sex	Male	6	60.0%	4	40.0%	10	χ^2=0.80 p=0.37
	Female	4	40.0%	6	60.0%	10	
Education	Primary	1	20.0%	4	80.0%	5	χ^2=4.00 p=0.26
	HSC	2	40.0%	3	60.0%	5	
	Graduate	4	80.0%	1	20.0%	5	
	Post graduate	3	60.0%	2	40.0%	5	
Type of ICU	NICU	4	50.0%	4	50.0%	8	χ^2=0.00 p=1.00
	IMCU	6	50.0%	6	50.0%	12	
Duration of suction	1 - 2 sec	4	66.7%	2	33.3%	6	χ^2=0.95 p=0.32
	3 - 5 sec	6	42.9%	8	57.1%	14	

Table 19 shows the association between heart rate changes and demographic variables. In age group 26-30 years patients s are having significant changes at p value is 0.01.

Table 20: Association between Level of Heart rate change and demographic variables (closed suction)

n = 20

		Heart rate changes				Total	Chi square test
		Below average (<-4.30)		Above average (>-4.30)			
		n	%	n	%		
Age	20 - 25 yrs	5	83.3%	1	16.7%	6	χ^2=4.14 p=0.24
	26 - 30 yrs	3	42.9%	4	57.1%	7	
	31 - 35 yrs	1	33.3%	2	66.7%	3	
	>35 yrs	1	25.0%	3	75.0%	4	
Sex	Male	9	75.0%	3	25.0%	12	**χ^2=7.50 p=0.01***
	Female	1	12.5%	7	87.5%	8	
Education	Primary	4	57.1%	3	42.9%	7	χ^2=6.28 p=0.10
	HSC	4	57.1%	3	42.9%	7	
	Graduate			4	100.0%	4	
	Post graduate	2	100.0%			2	
Type of ICU	NICU	6	46.2%	7	53.8%	13	χ^2=0.22 p=0.64
	IMCU	4	57.1%	3	42.9%	7	
Duration of suction	1 - 2 sec	4	44.4%	5	55.6%	9	χ^2=0.20 p=0.65
	3 - 5 sec	6	54.5%	5	45.5%	11	

Table 20 shows the association between heart rate changes and demographic variables. In females are having significant changes at p value is 0.01

Table 21: Association between Level of Oxygen saturation changes and demographic variables (closed suction)

n =20

		Oxygen saturation changes				Total	Chi square test
		Below average (<-0.90)		Above average (>-0.90)			
		n	%	n	%		
Age	20 - 25 yrs	5	83.3%	1	16.7%	6	χ^2=4.14 p=0.24
	26 - 30 yrs	3	42.9%	4	57.1%	7	
	31 - 35 yrs	1	33.3%	2	66.7%	3	
	>35 yrs	1	25.0%	3	75.0%	4	
Sex	Male	6	50.0%	6	50.0%	12	χ^2=0.00 p=1.00
	Female	4	50.0%	4	50.0%	8	
Education	Primary	4	57.1%	3	42.9%	7	χ^2=6.28 p=0.10
	HSC	4	57.1%	3	42.9%	7	
	Graduate			4	100.0%	4	
	Post graduate	2	100.0%			2	
Type of ICU	NICU	6	46.2%	7	53.8%	13	χ^2=0.22 p=0.64
	IMCU	4	57.1%	3	42.9%	7	
Duration of suction	1 - 2 sec	7	77.7%	2	22.3%	9	**χ^2=5.05 p=0.02***
	3 - 5 sec	3	27.2%	8	72.8%	11	

Table 21 shows the association between heart rate changes and demographic variables. In duration of suction 3-5 sec duration of suction patients are having significant changes at p value is 0.02.

Table 22: Association between Level of Respiratory rate changes and demographic variables (closed suction)

n = 20

		Respiratory rate changes				Total	Chi square test
		Below average (<-0.40)		Above average (>-0.40)			
		n	%	n	%		
Age	20 - 25 yrs	4	66.7%	2	33.3%	6	χ^2=5.58 p=0.13
	26 - 30 yrs	1	14.3%	6	85.7%	7	
	31 - 35 yrs	2	66.7%	1	33.3%	3	
	>35 yrs	3	75.0%	1	25.0%	4	
Sex	Male	5	41.7%	7	58.3%	12	χ^2=0.83 p=0.36
	Female	5	62.5%	3	37.5%	8	
Education	Primary	4	57.1%	3	42.9%	7	χ^2=0.28 p=0.96
	HSC	3	42.9%	4	57.1%	7	
	Graduate	2	50.0%	2	50.0%	4	
	Post graduate	1	50.0%	1	50.0%	2	
Type of ICU	NICU	4	30.8%	9	69.2%	13	**χ^2=5.49 p=0.02***
	IMCU	6	85.7%	1	14.3%	7	
Duration of suction	1 - 2 sec	6	66.7%	3	33.3%	9	χ^2=1.81 p=0.07
	3 - 5 sec	4	36.4%	7	63.6%	11	

Table 22 shows the association between heart rate changes and demographic variables. In type of ICU, Neuro ICU patients are having significant changes at p value 0.02

Table 23: Association between Level of MAP changes and demographic variables (closed suction)

n =20

		MAP changes				Total	Chi square test
		Below average (<-2.80)		Above average (>-2.80)			
		n	%	n	%		
Age	20 - 25 yrs	4	66.7%	2	33.3%	6	χ^2=2.14 p=0.54
	26 - 30 yrs	4	57.1%	3	42.9%	7	
	31 - 35 yrs	1	33.3%	2	66.7%	3	
	>35 yrs	1	25.0%	3	75.0%	4	
Sex	Male	6	50.0%	6	50.0%	12	χ^2=0.80 p=0.37
	Female	4	50.0%	4	50.0%	8	
Education	Primary	3	42.9%	4	57.1%	7	χ^2=2.42 p=0.48
	HSC	5	71.4%	2	28.6%	7	
	Graduate	1	25.0%	3	75.0%	4	
	Post graduate	1	50.0%	1	50.0%	2	
Type of ICU	NICU	6	46.2%	7	53.8%	13	χ^2=0.22 p=0.63
	IMCU	4	57.1%	3	42.9%	7	
Duration of suction	1 - 2 sec	7	77.7%	2	22.3%	9	**χ^2=5.05 p=0.02***
	3 - 5 sec	3	27.2%	8	72.8%	11	

Table 23 shows the association between heart rate changes and demographic variables. In duration of suction 3-5 duration of suction patients are having significant changes at P value is 0.02.

CHAPTER – V

DISCUSSION

This chapter discusses the result based on the stated objectives and provides explanation for testing the stated hypotheses leading to conclusions, recommendations for further generalization and utilization of the study.

The discussion of the study based on objectives and the findings of the study were as follows:

The first objective was to assess the effectiveness of open suction Vs cardio respiratory parameters among patients with mechanical ventilators

Table 6 depicts that the open suction heart rate before suction is 97.30, after suction is 99.20 and the difference is 1.90. oxygen saturation before and after suction is 98.00,95.60 and the difference is 2.40.the respiratory rate in before suction is 19.50 ,after suction is 22.30 and the difference is 2.80. the MAP before suction is 101.15 ,after suction is 117.90 and the difference is 16.75.the result suggest that the difference is large and statistically significant.

The study findings were supported done by **Reynold coletee(2010)** conducted a study on effectiveness of open suction and closed suction system. A randomized control trail was performed in a intensive medical care unit. The result showed that closed suction having significant changes in heart rate(95%) and MAP is (93%). Closed suction more seems to more expanse than the open suction.

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The second objective was to assess the effectiveness of closed suction Vs the cardio respiratory parameters among patients with mechanical ventilators.

Table 11 depicts that the heart rate before suction is 97.50, after suction is 93.20 and the difference is 4.30. Oxygen saturation before and after suction is 97.50,98.40 and the difference is 0.90.the respiratory rate in before suction is 19.50 ,after suction is 19.90 and the difference is 0.40. the MAP before suction is 101.15 ,after suction is 104.30 and the difference is 2.8.the result suggest that the difference is less and not statistically significant.

Tiwari (2012) conducted a study on effectiveness of open and closed endotracheal suction on cardio respiratory parameters among patients with mechanical ventilator in surgical ICU, 60 sample were randomly selected, the finding shows that more significant changes in heart rate P=0.01 and MAP P=0.1and oxygen saturation P= 0.1,. open suction the result is more adverse changes in cardio respiratory parameters compared to closed suction

The third objective was to compare the open suction and closed suction method with cardio respiratory parameters among patients with mechanical ventilators

Table 12 Shows that the comparison of **heart rate** in open and closed suction with cardio respiratory parameters in There is no significant difference between open suction and closed suction in **before** suction. There is a significant difference between open suction and closed suction in **during suction**. 't' value is 4.70, P value is 0.001

Table 13, shows that the comparison of **oxygen saturation** in open and closed suction and closed suction with cardio respiratory parameters. The oxygen saturation .the result shows that there is a significant difference between open suction and closed suction **during suction** t=8.77 and P=0.001

Table 14 represents Shows that the comparison of **respiratory rate** in open and closed suction with cardio respiratory parameters. The result shows that there is no significant difference between open suction and closed suction **before suction**. There is a significant difference between open suction and closed suction **during suction** = 7.97 and P=0.001.

Table 15 Shows that the comparison of **MAP** in open and closed suction and with cardio respiratory parameters. The results show that there is no significant difference between open suction and closed suction **before suction**. There is a significant difference between open suction and closed suction **during suction '**t'=5.96 P=0.001

The study finding were consistent with the study conducted by **Magda Mohamad (2007)** a quasi experimental study to assess the impact of cardio respiratory parameter in open and closed suction. A total of 60 patients with mechanical ventilator were selected. The researcher concluded that the closed suction has a significant change in cardio respiratory parameter.

Hence the NH_1 stated earlier that "there is no significant difference between open and closed suction on cardio respiratory parameters among patient with mechanical ventilator. In open suction there is significant changes in cardio respiratory parameters was rejected. In closed suction there is no significant change on cardio respiratory parameter was accepted.

The fourth objective was to associate the selected demographic variables with cardio respiratory parameter among patient with mechanical ventilators.

Table 16 shows the association between open suction heart rate changes and demographic variables. Females are having significant changes. P=0.01

Table 17 shows the association between open suction oxygen saturation changes and demographic variables. 3-5 sec duration of suction patients are having significant changes at P=0.05

Table 18 shows the association between open suction respiratory rate changes and demographic variables. 3-5 sec duration of suction patients are having significant changes at P=0.05

Table 19 shows the association between open suction MAP changes and demographic variables. 26-30years age are having significant changes at P=0.01.

Table 20 shows the association closed suction between heart rate changes and demographic variables. Females are having significant changes at P=0.01

Table 21 shows the association between closed suction oxygen saturation changes and demographic variables. 3-5 sec duration of suction patients are having significant changes at P=0.02

Table 22 shows the association between closed suction respiratory rate changes and demographic variables. IMCU patients are having significant changes at p=0.02

Table 23shows the association between closed suction MAP changes and demographic variables. 3-5 duration of suction patients are having significant changes at p=0.02

Regarding open suction female are significant changes in heart rate at $p<0.01$ and 3 – 5 second duration of suction are significant changes in oxygen saturation and respiratory rate at $p<0.05$ 1 and 26 – 30 years of age group has significant changes non MAP at $p<0.001$.

In closed suction female are having significant changes in heart rate at $p<0.02$ and 3 – 5 seconds duration of suction has significant changes in oxygen saturation and IMCU patients are significant changes in respiratory rate at $p<0.02$, 3 – 5 seconds duration of suction patients are having significant changes in MAP at $p<0.02$.

Hence NH_2 stated earlier, that there is no significant association between selected demographic variables with effectiveness of open suction Vs. closed suction method on cardio respiratory parameter among patients with mechanical ventilator was rejected.

CHAPTER – VI

SUMMARY AND CONCLUSION, IMPLIMENTATIONS AND RECOMENDATIONS

This chapter presents the summary conclusion, implications and recommendations,

SUMMARY

The aim of airway suction is to clear secretions, thereby maintaining a patent airway and improving ventilation and oxygenation. Removal of such secretions also minimizes the risk of atelectasis. However it is not a benign procedure and adverse physiological effects directly attributed to airway patency are well documented.

STATEMEMT OF PROBLEM

A comparative study to assess the effectiveness of open suction vs closed suction method on cardio respiratory parameters among patients with mechanical ventilators In selected hospital Chennai.

OBJECTIVES

Objectives of the study includes:

1. To assess the effectiveness of open suction Vs cardio respiratory parameters .among patients with mechanical ventilators.
2. To assess the effectiveness of closed suction Vs the cardio respiratory parameters .among patients with mechanical ventilators.
3. To compare the open suction and closed suction method with cardio respiratory parameters among patients with mechanical ventilators.
4. To associate the selected demographic variables with the cardio respiratory parameters among patients with mechanical ventilators.

Review of the literature was collected from various sources like nursing journals, literacy, Medline data base and pub med. A literature review is a summary of gathered investigator to continue the study.

The study was conducted in Fortis Malar Hospital Chennai.

A non randomized clinical trial, time series design was adopted to show the effectiveness of open suction and closed suction method on cardio respiratory parameter among patients with mechanical ventilators in selected hospital, Chennai.

Purposive sampling technique was used to select the sample. the investigator selected 40 samples who full fill the sampling criteria. In 20 sample were selected for open suction and 20 samples were selected for closed suction method. Cardio respiratory parameter was made to assess the effectiveness of open and closed suction method.

The tool was consist of demographic variables. Medical and nursing expert validated the tool` reliability of the tool was established by inter rater method.

The pilot study was done in Fortis Malar Hospital and finding of the study revealed the feasibility and the practicability of the tool and the study`

The ethical aspect of research was maintained throughout the study by the ethical committee clearance from the research committee of Indira college of nursing, formal permission from the authorities and from the bystanders of the patients who participated in the study.

The main study was done after getting formal permission from Malar Hospital Chennai, who satisfy the sampling criteria were selected as sample by purposive sampling technique. 20 samples were selected for open suction and 20

samples were selected for closed suction method. All selected patient were accepted to participate the study.

The data were collected from samples and analyze by using descriptive and inferential statistics.

CONCLUSION

The present study assessed the effectiveness of open suction Vs closed suction on cardio respiratory parameter among patient with mechanical ventilators. The study findings revealed that there is a significant differences in cardio respiratory parameter in open suction group and closed suction group and conclude that closed suction method is effective in to prevent the cardio respiratory parameter among patient with mechanical ventilators.

NURSING IMPICATIONS

The investigator has derived the following implications from the study which are vital concern in the field of nursing practice, nursing administration, nursing education, nursing research.

Nursing Practices

- The nurses play an important role in building knowledge and understanding the importance of suction methods in critical care units.
- Encourage the ICU's nurses to practice the evidence based practice to manage the patients with endotracheal suctioning.
- To emphasize the present study findings to implement by the ICU's in charges in all hospitals.

Nursing Educations

The nurse educator as a facilitate and expert in the field of nursing education should be give regarding :

- Importance of suction methods, which is best to prevent cardio respiratory complications.
- To educate the nursing staff and nursing staffs regarding importance of endo tracheal suction on patient with mechanical ventilators
- Provide adequate clinical exposure to the nursing student in ICU'S to acquire the knowledge on endo tracheal suctioning.

Nursing Research

The nurse researcher should realizes the need according to the changing health care needs of the consumer by assessing the best and effective suction method on cardio respiratory parameter which help to improve the level of airway clearance in patients with mechanical ventilators. Student will get idea to replicate this study to show the uses and create awareness about changes in cardio respiratory parameter while doing suctioning.

RECOMENDATIONS

1. .The study can be replicated on larger sample.
2. The similar study can be conducted as a one group pre test post test design.
3. Suction procedure can be compared with hospital infection control.
4. The study can be conducted in other settings.

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APPENDIX – C

LETTER REQUESTING FOR OPINION AND SUGGESTIONS OF EXPERTS FOR CONTENT VALIDITY OF THE RESEARCH TOOLS

From

Mr.J.Prem Kumar,
M.Sc(N), IInd year,
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To

Respected Sir/ Madam,

Sub: Requisition for expert opinion on suggestions for content validity of the tools for Nursing Research Dissertation.

I**, Mr.J.Prem Kumar,** Second Year M.Sc. (Nursing), student of Indira college of Nursing, Pandur, Thiruvallur District - 631203 , under Tamil Nadu Dr. M.G.R Medical University , Guindy, Chennai.

As a part of the curriculum requirement in Nursing Research dissertation I have selected the title mentioned below.

Topic: "**.**A comparative study to assess the effectiveness of open suction Vs closed suction method on cardio respiratory parameters among patients with mechanical ventilators, in selected hospital ,Chennai.

Here with I have enclosed the tool which I have prepared for my dissertation. For your kind perusal, kindly give your valuable suggestion, for the refinement and validity of the tool. Kindly do the needful and favor.

With regards,

(J.PREM KUMAR)

Place:

Enclosures:

1**.** Certificate of content validity
2. Statement of the problem and objectives of the study
3. Tool for the data collection
4. Self addressed envelope.

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APPENDIX – D

TOOL FOR DATA COLLECTION

SECTION A:

Demographic Variable:

1)Age

a. 20-25
b. 26-30
c. 31-35
d. 36 and above

2) Sex

a. Male
b. Female

3) Education

a. Primary
b. Secondary
c. Graduate
d. Post Graduate

4) Type of ICU

a. I.C.C.U
b. I.M.C.U
c. N.I.C.U
d. L.I.C.U

5) Duration of suction

a. 1-2sec
b. 3-4sec
c. 5sec and above

SECTION – B:

CARDIO RESPIRATORY PARAMETER

	BEFORE SUCTION					DURING SUCTION				
TIME	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CARDIAC PARAMETER										
HEART RATE										
MAP										
RESPIRATORY PARAMETER										
SPO2										
RESPIRATION RATE										

APPENDIX – E

Plagiarism Detector - Originality Report

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